Catalogue of American Amphibians and Reptiles.

Townsend, J.H. and E.M. Langan. 2006. *Tlalocohyla loquax*.

Tlalocohyla loquax (Gaige and Stuart) Mahogany Treefrog, Ranita Sonorense

Hyla (?) salvinii: Werner 1896:350. See **Remarks**.

Hyla gabbii: Dunn and Emlen 1932:25. See **Remarks**.

Hyla loquax Gaige and Stuart 1934:1. Type-locality, "Ixpuc Aguada, north of La Libertad, El Peten, Guatemala." Holotype, University of Michigan Museum of Zoology (UMMZ) 75446, adult male, collected 4 June, 1933, by L.C. Stuart (not examined by authors). See **Remarks**.

Hyla stadelmani Schmidt 1936:45. Type-locality, "Subirana Valley, 2800 feet altitude, Yoro, Honduras." Holotype, Museum of Comparative Zoology, Harvard (MCZ) 21310, adult male, collected 13 January, 1933, by R.E. Stadelman (not examined by authors).

Hyla axillamembrana Shannon and Werler 1955:383. Type-locality, "from 5 mi. S Lake Catemaco on San Andres Tuxtla-Minatitlán road," Veracruz, México. Holotype, F.A. Shannon 4083 (now University of Illinois Museum of Natural History (UIMNH) 67059), male, collected 8 February 1953, by J. Werler and J. Reid (not examined by authors).

Tlalocohyla loquax: Faivovich et al. 2005:107.

• **CONTENT.** No subspecies are recognized.

• **DEFINITION.** *Tlalocohyla loquax* is a medium-sized species in the *godmani* group, with adult males typically measuring 33–45 mm SVL and adult females 33–47 mm SVL. Dorsal surface smooth, ventral surface areolate. Head wider than it is long, but slightly narrower that the body. Snout moderately short, bluntly rounded in dorsal aspect and rounded in profile. Nostrils slightly protuberant. The canthus is rounded. Dorsal surface of head and surface of throat covered with smooth skin. The eyes are large, with horizontally elliptical pupils. Vomerine tooth patches on narrowly separated transverse ridges between moderately small, ovoid to elliptical choanae. Maxillary teeth spatulate. Paired vocal slits and a single subgular, median vocal sac present in males. Tympanum distinct, with a well-developed supratympanic fold originating at the orbit and extending posteriorly to the area of the insertion of the arm, covering the upper edge of the tympanum. The tympanum is large, usually one half to two-thirds diameter of eye, and separated from the eye by approximately two-thirds tympanum length. The arms are moderately long, with the upper arm more slender than the forearm. A transverse dermal fold is present on the dorsal surface of the wrist. Few or no tubercles may be present



Figure 1. *Tlalocohyla loquax* (Florida Museum of Natural History [UF] 137305) from Swabila, Depto. Gracias a Dios, Honduras (photograph by Josiah H. Townsend).

on the posterior ventrolateral edge of the forearm. An extensive axillary membrane extends to the interior part of the elbow. Fingers short and robust with broad rounded disc pads. Nuptial thumb pads absent in males. Prepollical pad slightly to moderately enlarged. Round, subarticular tubercles present on fingers, supernumerary tubercles are small or absent on fingers. A raised, tripartite palmar tubercle is present. Relative finger lengths I<II<IV<III. The disk on finger III equal in diameter or larger than tympanum. Hands moderately webbed with webbing formula of hands I 2–2 + or 2–3 II 1–2–III 2–1+ IV. The legs are moderately long and more slender than the arms. A transverse dermal fold is present on the heel, and a weak tarsal fold is present towards the distal end of the tarsus. Moderately long, slender toes with rounded, broadly expanded toe disks that are smaller than the finger disks. The subarticular tubercles present on toes are smaller and more conical than those on the fingers, the supernumerary tubercles are small, subconical, and numerous on the proximal portion of the toe. Relative toe lengths I<II<V<III<IV. Feet extensively webbed with webbing formula I 3 / 4–1 or 1–1 II 3 / 4–1+ III 3 / 4–1 1 / 2 IV 1 1 / 2–3 / 4 V. Lateral keels present on unwebbed portions of fingers and toes. Posteriorly directed vent has a short granular anal sheath and is immediately surrounded by rugose skin.

Adult coloration in life is as follows: dorsally pale yellow to dull reddish brown at night; yellow, gray or nearly white by day; usually with small, dark brown flecks or striations on dorsal surfaces of head, body, and limbs. Surfaces of the groin, thighs, axillary membrane, and webbing can be yellow, orange or red. Venter and flank pale to bright yellow. Iris coppery red with a gold edged pupil.

Larvae are large, reaching over 45 mm TL. McCranie and Wilson (2002) gave the following measurements for a Gosner Stage 33 tadpole (USNM lot 523467) from 2.2 km N of La Unión, Depto. Olancho, Honduras: body length 14.9 mm, tail length 30.5 mm, TL 45.4 mm. Compressed, ovoid body with body height 1.6 times that of greatest body width. Snout semicircular in dorsal view, bluntly rounded in lateral profile. Eyes moderately large, widely spaced and dorsolaterally directed. Dorsolaterally oriented nos-

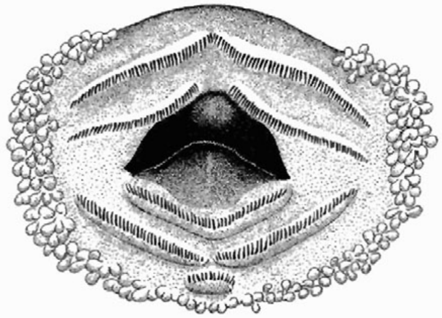


Figure 2. Mouthparts of *Tlalocohyla loquax* tadpole, University of Miami Research Collection (UMRC 79–316) from 15.8 km N of Panabá, Yucatán, Mexico (reprinted from Lee 1996; used with permission of the publisher).

trils may be equidistant between eyes and tip of snout or slightly closer to the eye. Spiracle sinistral and lateral, posterodorsally directed at midline at point about three-fourths distance from tip of snout to posterior end of body. Vent tube dextral. Thin tail musculature extends almost to tail's pointed tip; dorsal and ventral tail fins greater than midlength height of tail musculature with midlength height of dorsal fin slightly greater than that of ventral fin; dorsal fin extends onto body. Small oral disk oriented anteroventrally, with dorsal gap in marginal papillae, oral disk bordered laterally by two to three rows of marginal papillae, ventral portion bordered by one row of marginal papillae. Wide, dark jaw sheaths keratinized with small serrations; greatly arched upper jaw sheath with short, robust lateral processes; lower jaw sheath broadly V-shaped. 2 anterior and 3 posterior rows of denticles; anterior row 2 widely interrupted medially; posterior row 2 with a thin median gap; posterior row 3 reduced, shorter than beak widths.

In life, the body of larvae are light with a dark spot between the eyes and a dark, V-shaped mark oriented towards a spot between the eyes; orange iris; metallic silver or coppery venter; fins mottled with a dark pigment becoming solid grey posteriorly on two-thirds of tail. Tail musculature blotched with silver. Tadpole body color in formalin is primarily translucent light grey spotted with greyish-brown; tail musculature is cream with light brown blotching; translucent tail fins with brown to dark brown blotching, approaching a uniform color approximately from tail midlength to tail tip in advanced specimens.

The advertisement call of *Tlalocohyla loquax* is a short, loud series of notes variously described as a "kaaack" or "wonk", or resembling the honking of a goose. The poorly modulated call is irregularly repeated at intervals of 900 milliseconds to 5 seconds at a rate of 9–62 calls per minute, with note duration of 50–170 milliseconds. The frequency ranges between 900 kHz and 3000 kHz. The advertisement call may be followed by a drawn-out chattering note lasting about 300 milliseconds.

• **DIAGNOSIS.** *Tlalocohyla loquax* can be distinguished from other Central American members of the subfamily Hylinae by possessing the following combination of characters: bright red, orange, or yellow axilla, groin, anterior and posterior thighs and toe webbing; pale yellow, light brown, or grayish dorsal coloration; and an extensive axillary membrane. *Hypsiboas rufitelus* and *H. infucata*, the only other member of the Hylinae in Central America that may have red toe webbing, can be distinguished from *T. loquax* by having green dorsal coloration, prepollical spines in males and by lacking an axillary membrane (*H. rufitela*), and by having a blotched dorsal pattern, a snout that is long rather than blunt, and by lacking an axillary membrane (*H. infucata*).

• **DESCRIPTIONS.** Detailed descriptions of adults appear in Campbell (1998), Duellman (1967, 1970, 2001), Lee (1996, 2000), McCranie and Wilson (2002), Savage (2002), Savage and Heyer (1969 [1970]), and Taylor (1952).

Detailed descriptions of tadpoles appear in Campbell (1998), Duellman (1970 [see **Remarks**]; 2001), Lee (1996, 2000), McCranie and Wilson (2002), and Savage (2002).

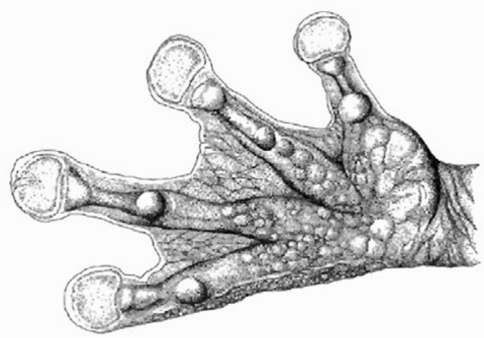
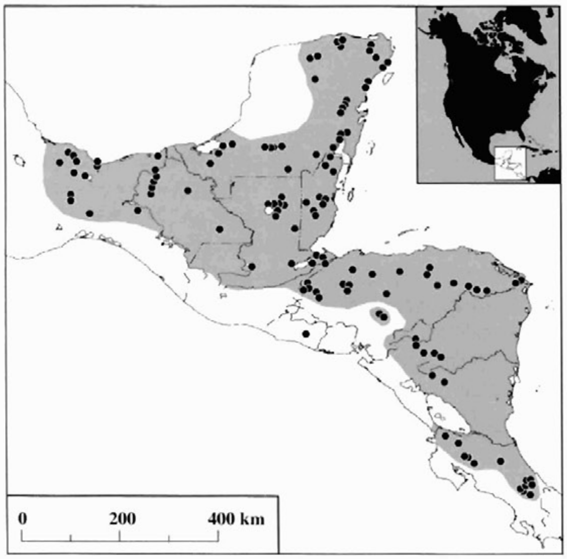


Figure 3. Hand of *Tlalocohyla loquax* UMRC 79–287) from 8.2 km N Felipe Carrillo Puerto, Quiatana Roo, Mexico (reprinted from Lee 1996; used with permission of the publisher).

• **ILLUSTRATIONS.** Color photographs appear in Campbell (1998), Guyer and Donnelly (2005; female, male, and inner thigh coloration), Köhler (2001), Lee (1996; in amplexus), Leenders (2001), McCranie and Wilson (2002), McCranie et al. 2006, Meyer and Foster (1996, 2000; in amplexus), and Savage (2002; in amplexus). Black-and-white photographs are in Villa (1972a) and Köhler (1999). Color illustrations are provided by Duellman (1970, 2001) and Galindo-Leal (2003). Black-and-white illustrations appear in Taylor (1952: dorsal surface and right side of head), Shannon and Werler (1955; dorsal surface and hand [as *Hyla axillamembrana*]), Duellman (1970, 2001; dorsal and lateral view of skull, hand, foot, tadpole,

mouthparts [see **Remarks**]), Villa (1972a; hand and foot), Lee (1996; axillary membrane, hand, dorsal and lateral views of tadpole, mouthparts), Lee (2000; hand, tadpole, mouthparts), Savage (2002; tadpole, mouthparts). Audiospectrograms and other illustrations of the advertisement call are provided in Duellman (1967, 1970, 2001) and Lee (1996). Distribution maps illustrating the range, or portions thereof, appear in Duellman (1970, 2001), Villa (1972a; Nicaragua), Lee (1996, 2000; Yucatán Peninsula), Köhler (1999, 2001; Nicaragua), McCranie and Wilson (2002; Honduras), and Savage (2002; Costa Rica).

• DISTRIBUTION. *Tlalocohyla loquax* occurs from sea level to 1650 m elevation, from the Mexican states of Veracruz and Oaxaca eastward through the Yucatan Peninsula, Belize, Guatemala, Honduras, Nicaragua, and central Costa Rica on the Atlantic versant, and from 930 to 1585 m elevation in southcentral Honduras on the Pacific versant. This species is also known from the Islas del Maíz, Nicaragua.



Map. Distribution of *Tlalcohyla loquax*. A circle indicates the type-locality, dots represent other known localities.

• FOSSIL RECORD. None.

• PERTINENT LITERATURE. References are listed by topic: **advertisement call** (Langebartel and Smith 1959); **biogeography and distribution** (Stuart 1950, Duellman 1960, Savage 1966, Heyer 1967, Scott 1976, Lee 1980, Johnson 1989, Wilson and McCranie 1998, Meyer and Meerman 2001, Wilson et al. 2001, and Jansen and Köhler 2002 [2003]); **bromeliads as refugia** (Galindo-Leal et al. 2003); **conservation** (Arrigoni 2003, Wilson and McCranie 2004); **interspecific associations** (Stuart 1961, Duellman 1963a, 1966a, Wilson et al. 1986, Roble 1997, Wollerman and Wiley 2002); **karyotype** (Gilboa 1975); **larval characteristics** (Savage 1980, Altig and Johnson 1986, Altig 1987; See **Remarks**); **literature review** (Taylor 1947, Smith and Smith 1976, 1993); **morphology** (Burton 2004); **reproductive biology** (Duellman 1967, Echternacht 1977, Duellman and Pyles 1983, Donnelly and Guyer 1994, and Emerson 1997); **systematic relationships** (Taylor 1942, Mertens 1952, Duellman 1963c, Jameson et al. 1966, Jameson and Richmond 1971, and Faivovich et al. 2005).

Tlalocohyla loquax appears in the following **faunal treatments, keys, distributional notes, and various other lists**: Stuart (1934, 1935, 1948, 1958, 1963), Smith (1938), Schmidt (1941), Taylor and Smith (1945), Barbour and Loveridge (1946), Smith and Taylor (1948, 1950), Peters (1952), Shreve (1957), Marx (1958), Langebartel and Smith (1959), Cochran (1961), Duellman (1963b, 1965, 1970, 1977, 2001), Gorham (1963, 1974), Lynch and Fugler (1965), Neill (1965), Smith et al. (1965), Meyer and Wilson (1971), Villa (1972a, 1972b, 1983), Savage (1973, 2002), Henderson and Hoevers (1975), Johnson et al. (1976 [1977]), Lee (1980, 1996, 2000), Pérez Higareda (1981), Harding (1983), Scott et al. (1983), Wilson (1983), Frost (1985), Savage and Villa (1986), Altig (1987), Flores-Villela et al. (1987), Pérez Higareda et al. (1987), Villa et al. (1988), Campbell and Vannini (1989), Hayes et al. (1989), Flores-Villela et al. (1991), Pelcastre Villafuerte and Flores-Villela (1992), Flores-Villela and McCoy (1993), Meerman (1993), Donnelly (1994), Liner (1994), Wilson and McCranie (1994), Flores-Villela et al. (1995), Kamstra et al. (1996), Lips and Savage (1996), Pounds et al. (1997), Vogt et al. (1997), Campbell (1998, 1999), Köhler (1998, 1999, 2001), Pounds and Fogden (2000), Gardner and Fitzherbert (2001), Leenders (2001), McCranie and Wilson (2002), Calderon et al. (2003), Galindo-Leal (2003), Sorba et al. (2004), McCranie (2005), Guyer and Donnelly (2005), McCranie et al. 2006, and Wilson and Townsend (2006).

• REMARKS. Werner (1896) provided the description of a specimen he referred to as *Hyla ? salvinii* that McCranie and Wilson (2002:269) remarked "can only apply to *Hyla (= Tlalocohyla) loquax*". *Hyla gabbii* Cope, a name subsequently placed in synonymy with *Smilisca sordida* by Duellman and Trueb (1966), was reported from Ceiba, Honduras by Dunn and Emlen (1932). Meyer and Wilson (1971:34), assuming the specimen referred to as *H. gabbii* to be lost, stated: "it seems probable that it was a misidentified *Smilisca baudinii*". McCranie and Wilson (2002:269) reported the specimen (USNM 55332) to be extant and subsequently identified it as *T. loquax*. Kluge (1983) stated that C.L. Lundell should be listed with L.C. Stuart as collector of the holotype since acquisition of the entire para-topotypic series, from which the holotype was taken, was attributed to them by Gaige and Stuart (1934) in the original description. Taylor (1949) indicated that *H. stadelmani* is likely a synonym for *T. loquax* but stopped short of placing the names in synonymy, citing a need to examine additional specimens. Upon comparing type material from

both *H. stadelmani* and *T. loquax*, Duellman (1966b) placed *H. stadelmani* into synonymy with *P. loquax*.

Lee (1996) pointed out that Duellman's (1970) description and illustrations of the tadpole of *T. loquax* are based on a misidentified specimen, an idea subsequently supported by Altig and McDiarmid (1999) and Savage (2002). Lee (1996, 2000), as well as Duellman (2001) and Savage (2002), presented descriptions and illustrations consistent with the tadpole of *T. loquax*. Savage (1980), Altig and Johnson (1986), and Altig (1987) based their larval characteristics for *T. loquax* on Duellman's (1970) erroneous description. Duellman (1970) assigned *T. loquax* in the *godmani* group. Faivovich et al. (2005), in a major taxonomic revision of the Hylidae, assigned this species and the other members of the *godmani* group to the newly-created genus *Tlalcohyla*.

Twelve paratypes were originally deposited in the UMMZ, five of which were subsequently moved to other collections: UMMZ 75441 (now USNM 94100); UMMZ 75443 (now FMNH 100165); UMMZ 75445 (now MCZ 21456); UMMZ 75450 (now UIMNH 43483); and UMMZ 75451 (now MCZ 19754).

• ETYMOLOGY. The specific epithet *loquax* is Latin for "garrulous", "noisy", or "talkative" and was attributed to this species by Gaige and Stuart (1934) in recognition of its "noisy song".

• COMMENT. Our use of the common names Mahogany Treefrog and Ranita Sonorense follow Liner (1994). Various other English and Spanish common names have been reported for this species: Swamp Frog (Hayes et al. 1989), Majogany Treefrog (Frank and Ramus 1995), Red-footed Frog (Kamstra et al. 1996), Rana Arborícola, Loquacious Treefrog (Lee 1996), Red-footed Treefrog (Meyer and Foster 1996), Rana Arborícola Loquaz (Campbell 1998), Rana Arbórea (Galindo-Leal 2003), and Swamp Treefrog (Guyer and Donnelly 2005). Museum acronyms follow Leviton et al. (1985).

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